DOCUMENT RESUME

ED 201 777 CE 028 739

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TITLE The Information Gap in Allied Health Manpower.
INSTITUTION Southern Regional Education Board, Atlanta, Ga.
SPONS AGENCY Health Resources Administration (DHHS/PHS), Hyattsville, Md. Div. of Associated Health Professions.
PUB DATE 81
GRANT PHS-5-D12-AH90131
NOTE 49p.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Allied Health Occupations; Allied Health Occupations Education; Data Bases; *Data Collection; Definitions; Educational Needs; *Educational Planning; Health Needs; *Information Needs; Labor Force; *Labor Needs; Labor Supply; Models; Needs Assessment; Research Design; *Research Needs; Research Problems; State of the Art Reviews

ABSTRACT

A study examined the extent of the deficit of data concerning allied health fields supply and requirements to determine the kinds of data and studies needed to improve the data base for health and allied health education. At present, data deficits exist in the areas of allied health occupations labor supply and requirements, future health needs, and educational needs. Current manpower forecasting models, which vary in scope, methodology, and assumptions, tend to concentrate on single occupations, usually ignoring other health professionals who can and may be providing the same services. Deficiencies and shortcomings of allied health manpower information have discouraged any attempt to treat health care delivery as a system. This hampers development of efficient and productive data collection procedures. Development of guidelines for well-coordinated research and data collection is essential in the areas of supply and requirements, distribution, utilization, and productivity. Enumerative, descriptive, and analytic information is needed in all four needs areas to plan and insure optimal utilization of resources. (A postscript contains suggestions for making decisions without ideal data.) (MN)

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THE INFORMATION GAP IN ALLIED HEALTH MANPOWER

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1981

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SREB's Allied Health Education Project is supported by Grant No. 5 D12 AH90131, Division of Associated Health Professions, Bureau of Health Professions, Health Resources Administration, Public Health Service, Department of Health, Education, and Welfare.

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FOREWORD

Planning for health and human services requires a substantial data base. In 1978, the Southern Regional Education Board undertook a project to facilitate regional planning and coordination for allied health education programs in the South with support from the Federal Bureau of Health Professions. One activity of that project was to attempt to develop a better base of information about the training and use of allied health practitioners in the South. The project soon found that while there is a scattering of data available, the data do not have sufficient reliability for making significant planning decisions.

The project staff discussed this problem with Dr. Engin Holmstrom, who had just completed the report of the National Commission on Allied Health Education for which she had been the study director. She confirmed that the problem of incomplete and inconclusive data about the allied health fields is a national as well as a regional concern.

She agreed to prepare this summary on the state-of-the-art regarding data in the allied health fields. Dr. Holmstrom has described the extent of the deficit of data, especially about allied health practitioners, and she has made suggestions for what kinds of data and studies are needed to improve the data base that might be used by health planners and allied health educational planners. There is also a short section on what allied health educational planners might do within their own states or localities to gather sufficient data to make the decisions which must be made in the absence of comprehensive national data.

The project staff is grateful to Dr. Holmstrom for her work in preparing this manuscript.

This project is supported by Grant No. 5 D12 AH90131 from the Division of Associated Health Professions of the Bureau of Health Professions. We are grateful for their support.

Harold L. McPheeters, Project Manager

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DEFINITION OF ALLIED HEALTH

For the purposes of this study, all personnel who provide the following services are defined as allied health, except physicians, osteopaths, dentists, veterinarians, optometrists, podiatrists, pharmacists, clinical psychologists, registered nurses, and licensed practical nurses:

- emergency services (e.g., emergency medical technicians, emergency/disaster specialists);
- reception and screening (e.g., medical and dental secretaries, medical office assistants);
- attending and other nursing-related services (e.g., nurse aides and orderlies, midwives);
- initial evaluation and diagnosis (e.g., nurse practitioners, physician assistants, dental hygienists, medical social workers);
- medical testing (e.g., medical laboratory personnel, radiologic technologists, ultrasound technical specialists, nuclear medicine personnel, cardiology equipment personnel);
- acute care therapy (e.g., operating room technicians, obstetrical technicians, surgeons' assistants);
- continued assessment and long-term therapy (e.g., occupational, physical, and other therapists; personnel in mental health, social services, counseling, speech pathology, audiology);
- medical instrumentation (e.g., radiation and respiratory therapists, dialysis technicians, cardiopulmonary technicians, ophthalmic dispensers, dental laboratory technicians);
- community health promotion and protection (e.g., nutritionists, population and family planning specialists, health educators, school health educators, medical librarians, health writers);
- environmental health promotion and protection (e.g., environmentalists or sanitarians, sanitarian technicians and aides, environmental engineering technicians and assistants);

- control and elimination of health hazards in an institutional or industrial setting (e.g., health physicists, health care facilities housekeepers, industrial hygienists);
- health systems management (e.g., hospital administrators, health planners, medical records personnel, medical computer specialists);
- research and development (e.g., biomedical engineers, biostatisticians, epidemiologists, toxicologists, public health scientists, researchers).

This definition is based on a classification scheme that was developed by the National Commission on Allied Health Education. The Commission identified two major service functions for allied health personnel: institutional, direct patient-care services; and community and health promotion and protection services. These two major service functions were then broken into the above listed service components. Initially nursing-related services were included in the Commission's working definition of allied health; however, the Commission later recommended that all nursing personnel be excluded from the category of allied health. For the purposes of this study, a number of nursing-related services are included, for example, those performed by nurse practitioners, nurse anesthetists, nurse aides and orderlies. (For a detailed description of the classification scheme and problems of definition, see National Commission on Allied Health Education, The Future of Allied Health Education. San Francisco: Jossey-Bass, 1980.)

INTRODUCTION

> The need for reliable statistical information on health manpower is nowhere more urgent than in occupations in the allied health field.[1]

This was the conclusion of a government study conducted during the early 1970s when allied health personnel comprised less than half the nation's total health work force. Today they account for about two-thirds, yet any assessment of the supply and demand relationship for allied health manpower remains just as difficult as it was a decade ago.

Only rough estimates are available on the number of allied health professionals and even less is known about their labor market participation and separation rates, employment settings, practice patterns and preferences. Almost no information exists on the transfer of workers into allied health occupations from other fields or about the size of the inactive pool of allied health workers. The data sources are somewhat better for educational programs. In recent years limited funds have been made available for the collection of data on education programs in colleges and universities and in hospitals, but very little is known about programs in other settings and about workers who enter the labor market through routes other than formal training.

Mandated by the Health Professions Educational Assistance Act of 1976 (P.L. 94 484) to provide Congress with detailed information on the status of health professionals, the Bureau of Health Professions (BHP) and its Division of Associated Health Professions (DAHP) have tried over the years to improve

and expand the data sources on allied health manpower. The one project that clearly demonstrates the problems involved in obtaining reliable manpower information is the one called Allied Health Employment Matrix which cost the government nearly $600,000. Awarded first to Information and Communication Applications (ICA) of Rockville, Maryland, the contract asked for development of 1973 national estimates for 48 allied health occupations. From 1975 to 1977, ICA gathered over 1,300 documents containing employment data, developed a set of criteria to evaluate the validity and reliability of the information contained in these documents, and found that only 51 of the over 1,300 studies were technically acceptable. Estimation procedures could not be applied to 29 of the 48 allied health occupations originally included in the study; in addition, the estimates for the remaining 19 occupations were found by DAHP to be "unreliable due to the lack of available sources for data."[2]

In 1977, the Division of Manpower Analysis of the BHP awarded the Applied Management Sciences (AMS) of Silver Spring, Maryland, a contract to expand the data source used by ICA from 51 to 200 documents and provide national estimates for 1976. AMS was able to generate national estimates for only 15 allied health occupations, and not necessarily for all states.[3] Table 1 presents the AMS-generated manpower estimates for the 14 SREB states. The inconsistencies in data availability clearly demonstrate how widespread the problem is.

The DAHP lists the following as problem areas which have impeded efforts to develop a reliable information system in allied health:

- the large numbers of persons engaged in allied health fields--estimated to be in excess of 3 million,
- the large number of discrete occupations involved--more than 100 occupations and as many as 250 secondary or alternate job titles,

TABLE 1. 1976 FTE Manpower Estimates for Selected Allied Health Occupations in SREB States

	Audiologist	Speech Pathologist	Dietitian	Medical Technologist	Medical Laboratory Technician	Medical Records Administrator	Medical Records Technician	Occupational Therapists	Occupational Therapy Assistant	Physical Therapist	Physical Therapy Assistant	Radiologic Technologist	Respiratory Therapist	Respiratory Therapy Technician
Alabama	38.1				3,605.2	287.6		58.2	45.0	196.2	49.8	1,390.3		
Arkansas										97.5				
Florida				2,025.3	1,992.1	175.2	285.5	104.0	49.2	654.3	158.4	2,773.2	391.5	
Georgia			426.8	1,447.0	1,724.8	135.0	180.4	67.8		377.1		1,490.7		
Kentucky					666.4		283.9	82.6			81.6	1,564.8	519.4	
Louisiana												991.4		
Maryland			602.4							90.4				
Mississippi			165.7							571.9		1,998.3		
North Carolina			457.6	1,815.6		239.6		68.2		145.3	33.4	1,008.8		290.2
South Carolina				458.7	1,042.5			39.4	57.6	224.1		1,467.9		
Tennessee					3,262.9	76.5	251.5	115.3		1,251.0	59.0	4,272.3		
Texas		377.5	1,336.8	5,933.9	2,287.9	686.4	1,295.5	460.3	82.8	483.2		2,304.8	444.3	
Virginia	32.9		401.5	1,108.1	1,072.7	260.7	484.0	124.2	122.4	96.2		867.4	145.8	
West Virginia		191.4		598.5		115.0		42.6						

Source: Robert T. Deane, Stephen Wilson, and Jane F. Rooney, Health Manpower Data Search and Matrix, Silver Spring, Md.: Applied Management Sciences, 1979.

- the large and varied number of employment settings in which they work,
- the lack of licensure in all except one or two fields, which prohibits counting or tracking,
- the limited financial and legislative support for these fields,
- the rapid growth in numbers within allied health fields in recent years,
- the rapidly changing nature of many of the occupations,
- the local nature of the responsibility for education and training of these workers,
- the high cost of data collection for such a diversity of occupations and settings,
- the relatively small numbers nationally in some fields,
- the lesser proportions of allied health graduates who remain in these fields and the high degree of occupational mobility, and
- the need to obtain data from hospitals and nursing homes largely through National Center for Health Statistics and the Cooperative Health Statistics System, which have delayed mounting any such surveys.[4]

In addition, the problem of definition has plagued the allied health fields for years. Over the years, different federal agencies, and sometimes the same agency, have included different occupations as allied health. For instance, early government reports have included licensed practical nurses as allied health; the more recent ones do not. The Veterans Administration, however, continues to include all nurses as allied health. The inconsistencies in use generally reflect the funding priorities of different federal agencies and confound identification of allied health. DAHP has funding responsibility for both allied health and public health, and counts all personnel with community related services as public and not allied health. In the 1979 report to

Congress, DAHP excluded health administrators, environmental workers, nutritionists, epidemiologists, health statisticians, and health educators from the category of allied health.[5] In contrast, the National Commission on Allied Health Education, a two-year commission supported by a grant from the W. K. Kellogg Foundation, defined allied health functions as having both patient-care and community-care focus, and, as a result, projected a very different image of allied health personnel and services than did DAHP.[6]

Because there are no adequate national surveys of employers or practitioners, federal agencies involved with estimating allied health manpower usually get their information from professional associations. In medicine and nursing, most of the data-collection responsibilities lie with one or two professional associations. In allied health there are over 60 organizations that represent single allied health occupations and another 50 to 60 that represent larger constituencies. The National Commission on Allied Health Education surveyed these organizations and found that just about half were involved heavily in membership surveys and only about one in four undertook any manpower studies.[7]

The quality of data provided by professional associations varies and presents many difficulties. Membership surveys undertaken by professional associations provide information on members only and are not representative of the total field. For example, the American Dental Hygienist Association represents about two-thirds of all active hygienists but only about one-third of all licensed hygienists.[8] Further, most membership surveys do not differentiate between active and inactive members. Certification registeries and licensure records usually overstate the supply by including inactive members. At the

same time, active practitioners who are not credentialed are omitted. The number of physical therapists listed in the DAHP report (30,000 for 1978) is considered to be an overcount, due to duplication in registry records.

There is a curious phenomenon in allied health that amuses some and aggravates others. Professional associations are asked by government agencies for their "best estimates." In most cases, the best estimates are no more than optimistic guesses, but once these figures are published in a government report, they turn respectable and are treated as "factual." They form the reference point for government agencies and professional associations alike to make other estimates and projections. Thus, estimates based on estimates confuse allied health manpower numbers and impede effective planning and administration of allied health programs. Finally, the inadequacy of manpower information has negative consequences for health manpower planning in general. Most health manpower forecasting models do not take into account the varied patterns of utilization of health professionals who are essential to meeting the health needs of the nation. Narrow-focused occupational projections perpetuate a nonsystemic approach to the nation's health care delivery "system" and ignore the significant and vital services performed by allied health professionals.

The next section presents a brief description of health manpower forecasting models as a basis for discussing in more detail the data elements missing in allied health. The difficulties involved in making allied health supply and requirements projections are documented and their consequences are briefly outlined. Finally, a research agenda is offered, treating in a more systemic way the information needs of all health manpower.

ALLIED HEALTH MANPOWER DATA NEEDS

Basic to manpower planning is the need for information on supply and requirements. Supply may be defined as the total number of currently available and active workers. Requirements refer to the number of persons necessary to provide a specified level of services. Requirements can be expressed as needs (the total number of personnel needed to provide a level of health service judged adequate or desirable by experts) and demand (the number of individuals that employers will hire given certain economic conditions and consumer preferences).[9] Requirements expressed as needs reflect social ideals, while requirements expressed as demand reflect economic reality.[10] Needs can be converted to effective demand through increased income, expanded health insurance coverage, and other economic means.

Supply and requirements are two major components of manpower forecasting models which may vary in scope, methodology, and assumptions. For the nursing profession, there are currently four major forecasting models, each supplying policymakers with a wide range of information essential to evaluating program alternatives for nursing personnel. The Vector model is designed to assess the impact which the introduction of national health insurance would have on requirements for registered nurses, the increased enrollment in health maintenance organizations, and the reformulating of nursing roles. The Vector model does not provide supply estimates but projects requirements only. Another model, developed by Community Systems Foundation (Washington, D.C.), estimates

the demand for nurse manpower in four types of employment settings: acute care, long-term care, ambulatory care, and community and public health care. This model provides supply projections, but these projections are made independent of demand estimates. A third model, designed by Pugh-Roberts Associates (Cambridge, Massachusetts), takes account of the interaction between nurse supply and demand, and employs a modeling technique designed for flexibility in addressing a range of policy issues. The WICHE model, developed by Western Interstate Commission on Higher Education, is intended as a guide for state planners and relies heavily on state health care goals to determine the requirements for nursing personnel.[11]

Similarly, there are two major forecasting models for projecting physician supply and requirements--the Supply Output and Requirements (SOAR) model, developed by the Division of Health Professions of the Department of Health and Human Services (DHHS), and the model currently being developed by the Graduate Medical Education National Advisory Committee (GMENAC)--another DHHS-supported project.[12] The major difference in these two forecasting models is the method employed in measuring requirements. Simply put, SOAR is a trend-projection model, utilizing current physician-to-population ratios as the basis for future projections of physician requirements; GMENAC is a goal-driven or normative model that relies on expert judgment to determine medical need for physician services.

The SOAR model makes demographic projections of the United States population by age, sex, and income groups to different target dates. It then determines utilization rates for 18 types of health service settings; after various extrapolations, it projects the manpower level required in each of the 18

types of health care settings for each target date. The SOAR model is sensitive to a number of factors affecting physician utilization (for example, changes in consumer prices for health services), but the dependence on current utilization rates is a serious limitation of the model. The current national health scene with its maldistribution of services does not necessarily present an ideal state from which to make future projections.

In contrast, the GMENAC model relies heavily on medical opinion to determine what health service needs should be. This model estimates all diseases and conditions that should be treated by physicians for various subgroups of the U.S. population. The model then projects the amount of physician services that should be provided in 1990 on a disease-by-disease and condition-by-condition basis. The results are expressed in terms of physician use on a specialty basis, while the results of the SOAR model are expressed in terms of demand by health care setting. The GMENAC model also differs from the SOAR model in that it is expected to weigh the effect on physician requirements of those services rendered by nonphysician health care providers, such as physician assistants and nurse practitioners. Both models provide estimates for current and future supply of physicians by specialty and geographic distribution. In addition to these federally supported SOAR and GMENAC models, there are others developed at the state level, with variations in basic projection methodologies utilized.[13]

Despite slight variations, most forecasting models share certain formal procedures. They all make assumptions regarding socioeconomic and political factors shaping the health care system of the nation as well as those factors affecting the production and utilization of the manpower under study. Histor-

ical trend data are used to study how these factors have operated in the past in order to predict how they will function in the future. Economic and medical knowledge, backed by numerous research findings, help select variables as measures of, or proxies for, conditions that will prevail during the target period.

The validity of manpower projections generally "reflect the realism of the assumption about the future and the quality of the data that describe the past and present."[14] The data problems in allied health make the application of sophisticated methodologies very difficult. DAHP is currently supporting a feasibility project evaluating components of the SOAR model for their validity and appropriateness for occupational therapy and physical therapy. These two occupations were selected because they have relatively reliable manpower information, due, in turn, to their strong professional associations and the existence of credentialing requirements. Nonetheless, the project is experiencing serious problems obtaining all the information required for the SOAR model.[15] This project will serve to highlight the extent of the data problem even in occupations which enjoy a reputation for providing reliable and usable data. The following section discusses some of the data elements needed to make allied health supply and requirements projections.

DATA NEEDS FOR PROJECTING ALLIED HEALTH SUPPLY

Two basic questions are asked to determine supply projections: first, How many people are out there at a particular point in time? Second, How many people will be out there at some future time? The essential data needs in making supply projections include (a) baseline data on the supply of health personnel defined as the employed and the unemployed seeking work (current

supply); (b) data on entrants as a result of the addition of new graduates, occupational and geographic mobility, and reentry into the labor force of inactive professionals (entrants or inflow), and (c) data on occupational losses reflecting deaths, retirements, and occupational and geographic transfers (losses or outflow).[16] Thus, supply in the future period equals current supply plus entrants during the projection period minus occupational losses.

Supply projections are relatively easier to estimate in occupations where the labor market entry routes are tightly controlled through various credentialing mechanisms. For instance, any addition to physician supply is determined by increases in the number of graduates from accredited schools of medicine and osteopathy in the United States and of those graduating from foreign schools--whether they are foreign physicians immigrating or U.S. citizens returning. In contrast, entry routes into many allied health occupations are not controlled and the number entering the labor force without going through formal training programs remains unresearched and unknown.

The key element in estimating future supply is the number of practitioners currently active. In 1978, just over 3.5 million allied health personnel were employed full time. Such total figures are meaningless, however; practitioner surveys and detailed employer surveys are needed to determine the number of active manpower in each allied health category before future supply projections can be made. Since very little information is available on labor force characteristics of most allied health personnel, active or inactive, assumptions cannot be developed as proxies for missing data elements.

The size of the inactive pool is particularly essential to determining allied health supply. First, allied health occupations, especially those requiring one of two years of training, have high supply elasticity: that is, manpower responds quickly to marketplace incentives.[17] A substantial increase in salaries offered to occupational therapy assistants, for instance, may produce an almost immediate inflow of occupational therapy assistants already trained but inactive, as well as attracting workers from other health, and even nonhealth, occupations. Second, most allied health workers tend to be women. Their separation rates from the labor force usually follow a bimodal distribution: it is generally high during the childbearing years, low afterwards, and high toward the end of work life. A considerable proportion of entrants into allied health occupations may be returning mothers. In a study using 1965-1970 Census data, Wash found that new entrants (those working in 1970 who were not employed in 1965) to such health occupations as dietetics and nursing tended to be 35 to 54 years of age, indicating that they were returning to work after the childcaring years.[18]

In recent years, more women are participating and persisting in the labor force. Unless current and complete information for all allied health occupations are provided on the size, characteristics, and work preferences of active as well as inactive workers, supply estimates are bound to remain inaccurate. Further, the relationship between incentives and labor market participation rates has to be studied in order to provide policymakers with information essential to evaluating program alternatives. It is generally assumed that the retraining of inactive manpower is cheaper than the training of new manpower, but in occupations that require only short-term training, this may not be the case.

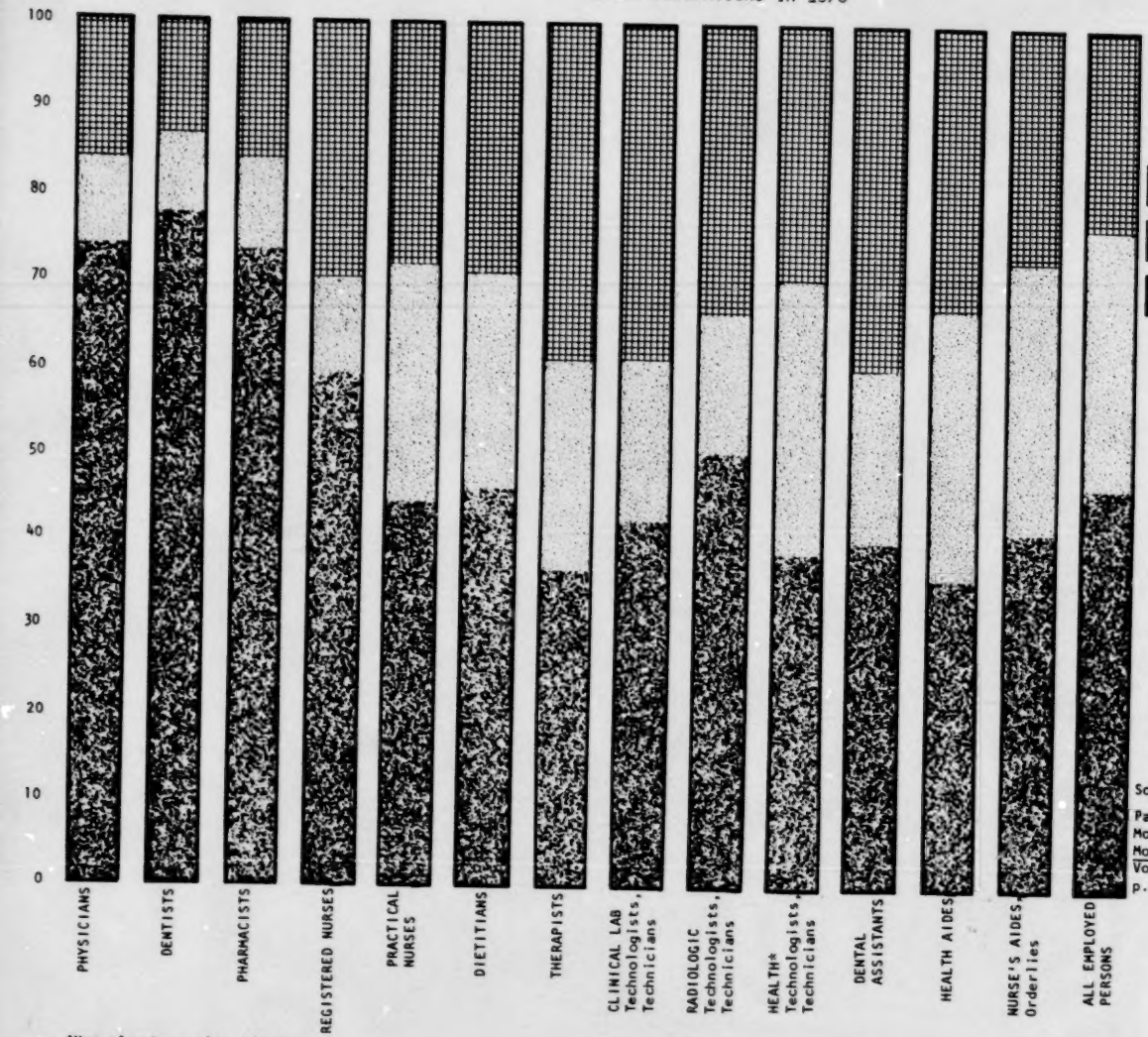
While estimating current supply remains problematic, estimating potential supply of formally trained personnel has been made somewhat easier by a number of DAHP-funded surveys of programs in colleges and universities, and in hospitals.[19] Such settings now house a majority of postsecondary programs currently available in allied health. However, there is very little information on other postsecondary programs, such as private career schools. Although only a few allied health occupations have a majority of their programs in such settings, these programs together with the programs in the armed services provide about two-fifths of the allied health graduate supply each year.[20] Clearly, the short-term postsecondary career programs contribute significantly to the inflow of formally trained workers; yet there are no national or regional studies regarding the effectiveness of these programs, the exact number of their graduates, and the quality of the manpower they produce. Similarly, other than rough estimates, little is known about the transition into the civilian labor market of over 30,000 men and women trained in allied health programs in the armed services. Finally, although much of the training at the aide and assistant level still takes place on the job, no estimates of on-the-job trained allied health manpower are currently available.

The manpower tracking problems in allied health are further excerbated by the lack of credentialing in many allied health occupations and by the high supply elasticity of the allied health work force, resulting in high turnover rates. Wash found that health occupations in general tended to have somewhat lower turnover rates than the national average for all occupations.[21] This is to be expected since occupational attachment varies directly with the amount of investment in training and education. Thus, those occupations with shorter

or less specialized training tend to be less stable than other health occupations. Among allied health occupations included in the Wash study, the radiologic technologist-technician group, which requires highly specialized training, tended to be the most stable: one-half of the radiologic technologists/technicians employed in 1970 had been working in the same occupation in 1965. In contrast, the rate of turnover was highest among allied health occupations requiring the least specialized training, such as nurse aides and orderlies, other health aides, other "technologists/technicians," and also, surprisingly, for the group identified as "therapists." In each of these groups, over three in five workers employed in 1970 were either unemployed in 1965 (that is, new entrants) or were employed in another occupation (that is, transfers). In most health occupations, however, between one-fifth to one-fourth of transfers came from other health occupations and most of the transfers indicated upward mobility. For instance, nurse aides and orderlies and other health aides constituted a majority of those who transferred into clinical technician and other health technician positions. Separation rates for aides and for dental assistants were exceptionally high. Dental assistants were a particularly volatile group with a high rate of "other labor force separations"--a category that contained any separation other than deaths and transfers, such as those due to retirement or family responsibilities. The proportion of new entrants was highest for dental assistants (39.3 percent), followed by therapists and clinical laboratory personnel (see Figure 1).

These figures show how difficult yet vital it is to track allied health personnel. The characteristics of the labor force can change dramatically within a short span of five years. For instance, surveys of dental assistants

FIGURE 1 THE 1965 STATUS OF PERSONS ENTERING HEALTH OCCUPATIONS IN 1970



*Not elsewhere classified

Source:

Patrick Wash, "Occupationa Mobility of Health Workers Monthly Labor Review, Vol. 100, No. 5, Table 2, p. 27.

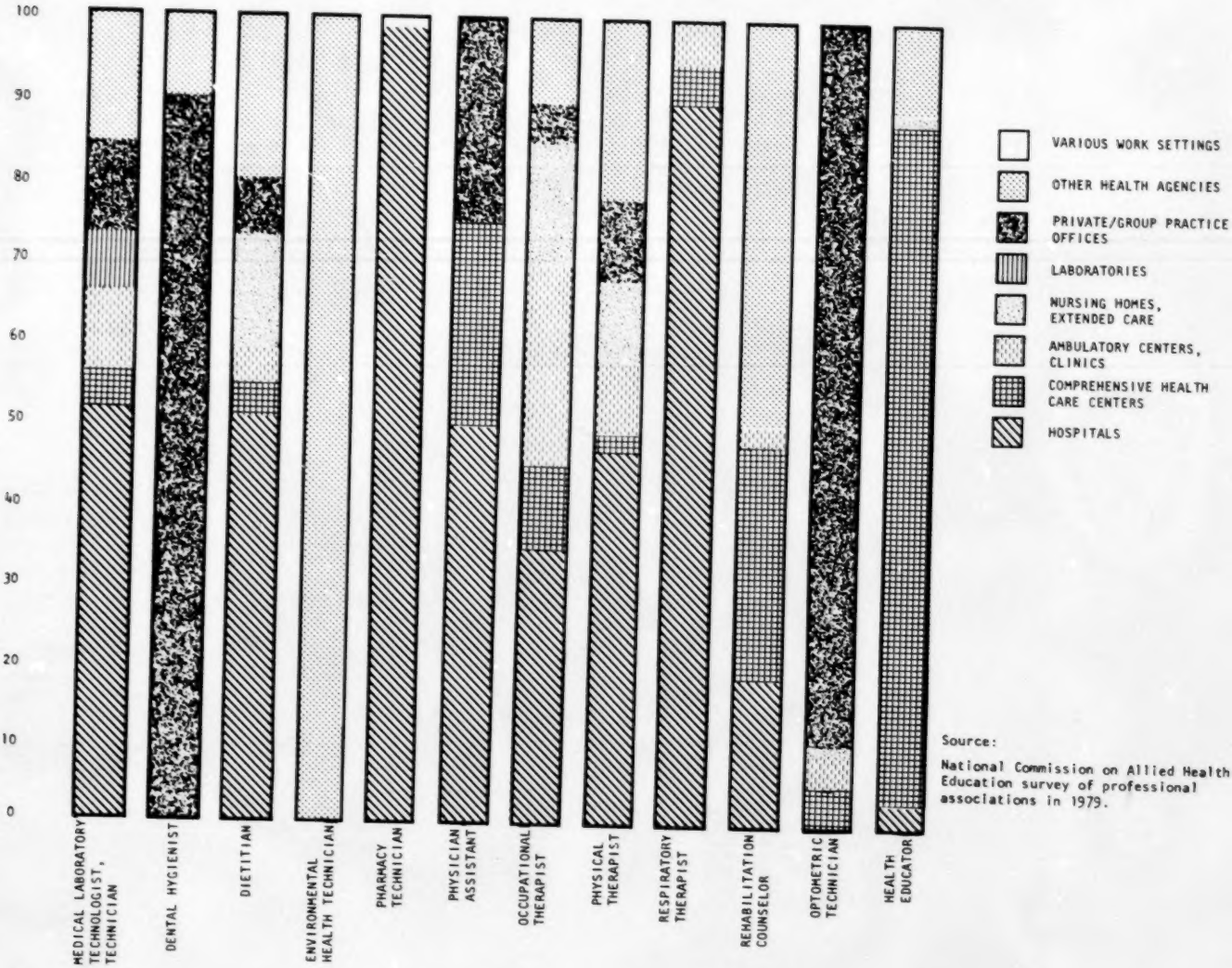
taken at five year intervals can be expected to find only two dental assistants out of every five in the labor force covered in both surveys. The remaining three would be newcomers: two would be working for the first time in five years, one would be transferring from another occupation. In contrast, the turnover rate among physician manpower is very low: three out of four physicians counted in the first survey would be included in the second survey.

The fluidity of allied health manpower reflects its youth and the rapid growth in most occupations, but it also reflects the fact that some are dead-end jobs, particularly at aide and assistant levels, and induce a high turnover rate among the dissatisfied labor force. Unless the pattern of allied health manpower flux is better researched and documented, accurate supply projections are very difficult to make.

DATA NEEDS FOR PROJECTING ALLIED HEALTH REQUIREMENTS

Projections for manpower requirements remain more complex and controversial than projections for supply. The demand for health manpower is determined by many factors, including the size, the growth rates, and other characteristics of the general population; income levels and insurance coverage policies; changes in the productivity of workers, health technology, and health service delivery.[22] Although these variables have been studied in detail for the total health system and for specific occupations, such as medicine and nursing, their impact on allied health requirements remains obscure and indeterminate. Further, allied health requirements depend on the supply of other health professionals. For instance, an oversupply of physicians may reduce demand for some allied health professions, such as physician assistants. On the other hand,

FIGURE 2 DISTRIBUTION OF SELECTED ALLIED HEALTH PERSONNEL WITHIN EMPLOYMENT SETTINGS, AS ESTIMATED BY PROFESSIONAL ASSOCIATIONS REPRESENTING THESE PERSONNEL, 1979



Source:

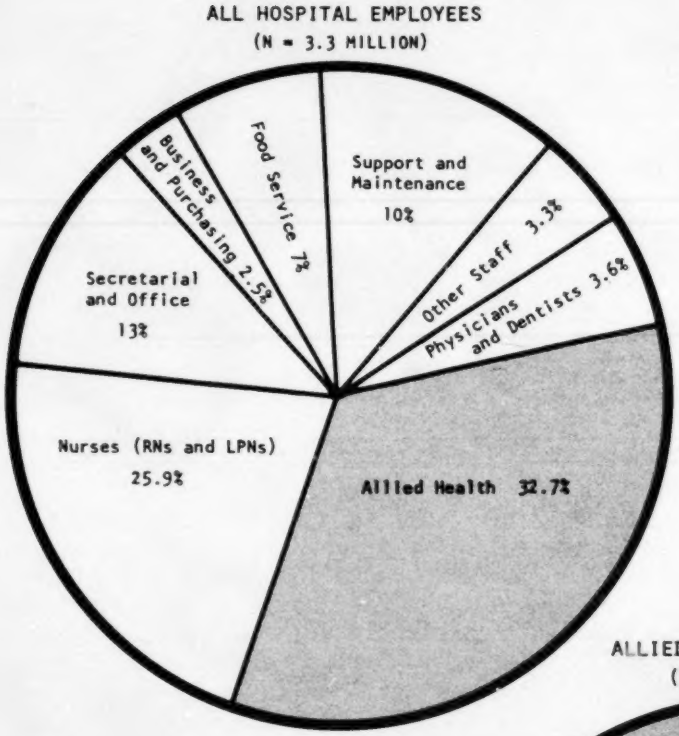
National Commission on Allied Health Education survey of professional associations in 1979.

the use of such personnel tends to increase physician productivity, possibly counteracting any reduction in demand deriving from physician oversupply.[23]

Similarly, job shortages may have a more adverse effect on less well-established occupations than on others. In investigating the effects of cost-containment efforts in New York hospitals, the National Commission on Allied Health Education found that nurses assumed some of the roles and functions of allied health personnel who had been laid off.[24] How prevalent this practice is cannot yet be ascertained. However, the impact of cost-containment efforts does not always seem negative: While it may adversely affect lower-level personnel, narrow-skilled technicians, and those not directly involved with patient care, it tends to increase the demand for administrators, office personnel, and medical records personnel. These complex interrelationships are not easily studied but must be thoroughly understood for planning and policy purposes.

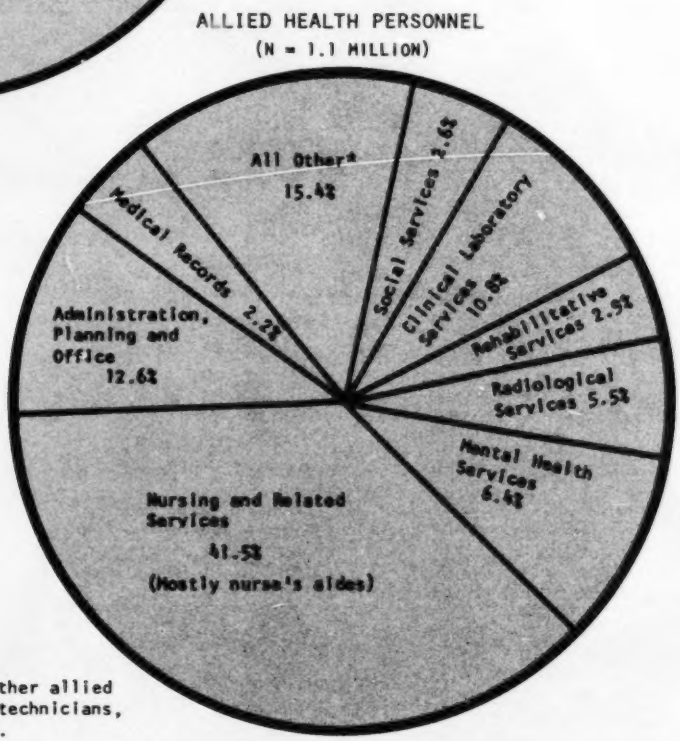
The multiplicity of employment settings also make projections for requirements difficult. Employer surveys are needed to determine exactly where allied health personnel work. The National Commission on Allied Health Education asked the professional associations to estimate the distribution of their members by employment setting (see Figure 2).[25] This 1979 survey showed that some allied health professionals work predominantly in one setting, for example, respiratory therapy personnel, pharmacy technicians, radiologic technology personnel, and corrective therapists work predominantly in hospitals; clinical chemists and histotechnologists in laboratories; dental assistants and dental hygienists in private or group practice offices. Others are employed in a variety of settings.

FIGURE 3 DISTRIBUTION OF HOSPITAL EMPLOYEES IN 1976



Source:

National Commission on Allied Health Education estimates based on data provided by the Bureau of Labor Statistics



*Includes a variety of technicians and other allied health workers (e.g., encephalographic technicians, medical illustrators, health educators).

In 1976, only about one million of over three million allied health personnel were employed in hospitals.[26] Yet at the national level, employer information is most often obtained only for the hospital setting; even here, inconsistent or vague use of terminology makes identification of allied health services difficult. Based on available data, nursing related services (mostly nurse aides and orderlies) comprise two-fifths of all allied health personnel employed in hospitals, followed by administrative and clerical services (13 percent), clinical laboratory services (11 percent), and mental health and radiologic services (each 5 percent). Other allied health personnel employed in hospitals constitute a small proportion of the total employed (see Figure 3).

Again based on best available data, and covering a period from early to mid-1970s, one can estimate that allied health personnel comprise over two-thirds of the staff in health maintenance organizations (HMOs), over three-fourths of nonphysician employees in physicians' offices, over two-thirds of employees in mental health facilities, over three-fifths of the staff in nursing and rest homes, nearly seven in ten employed in health services in the Federal Prison System, and about one-fifth of the workers in college infirmaries.[27] There are also other settings that are beginning to employ increasing numbers of allied health personnel. For instance, because of the rapidly rising costs of employer health benefits, industry is getting more involved in providing health services to its employees through on-site health programs or primary care clinics. Such services include pre-employment examinations, health surveillance through multiphasic testing, health education, diagnosis and treatment of occupational and nonoccupational injuries and illnesses, and counseling. In addition, specialized programs for hypertension,

alcoholism and drug abuse, weight control, smoking cessation, and immunization are mushrooming.[28] These developments in industry-provided health care services are bound to create increasing demand for allied health practitioners, particularly those with broad skills and competencies. Any projections for manpower requirements must take cognizance of the increasing diversity of work settings requiring allied health personnel; this is one reason why the conclusions reached by the National Commission on Allied Health Education and by BHP regarding allied health manpower requirements were so different.

In their projections for the coming decade, the National Commission on Allied Health Education projected generally favorable employment conditions.[29] These projections were based on a qualitative approach that considered carefully all the possible changes in health care services and settings that could affect the utilization of allied health manpower. Considering the major changes that are taking place in the national health care delivery system, and given the rapidly accelerating nature of technological change in medical service and medical knowledge, the Commission concluded that the demand for allied health services would continue to increase, but at a slower rate. Given the trend toward cost-effectiveness, the Commission suggested that the demand for office workers, medical records personnel, and administrators will continue to be high. In contrast, utilizing a predominantly quantitative approach, the DAHP-BHP report to Congress stated that the large shortages in allied health personnel that were apparent in the last decade have been alleviated or eliminated for some occupations.[30] DAHP listed medical records among those occupations in which shortages no longer exist. The projections of the Bureau of Labor Statistics for allied health requirements were also more optimistic than those

of DAHP.[31] These contradictory or varying conclusions most probably reflect the differences in approach to handling incomplete and unreliable data. As advocated by Mase for years, a combination of "guesstimates" and expert opinion may still yield better results than a purely quantitative approach.[32]

The Bureau of Labor Statistics utilizes an economic model to make occupational projections. This model, although sensitive to general changes in the nation's economy, does not fully account for the rapidly changing conditions in the health care system that affect the production and utilization of allied health personnel. For instance, any significant change in the health care delivery patterns may impact more directly on allied health personnel than on other professionals, but the effects of these changes would not be the same for all allied health personnel. Those with narrow skills may be expected to be more susceptible to such changes than those with broader skills. Further, such changes would have multiple effects, modifying requirements for all health personnel. Swift and others have shown that if member enrollments in HMOs were to increase from their 1970 rate of 2 percent to 28 percent of the total population by 1990, then most government projections for health manpower would have to be revised considerably. Whereas there would be fewer physicians and nurses required, the demand for various categories of allied health professionals (such as physician assistants, medical records personnel, clinical laboratory technicians) would increase substantially.[33]

In conclusion, the accuracy with which allied health manpower requirements can be projected relies to a large degree not only on the availability of data elements essential to all occupational projections but also on the analyses of variable employer demand setting-by-setting and service-by-service.

Further, role delineation and task analysis studies are needed to clarify both the distinct and the overlapping roles and functions of all health personnel. Only when the results of such studies are available can the categories of health professionals needed to provide specific services be projected realistically.

In summary, the current forecasting models tend to concentrate on single occupations, usually ignoring other health professionals who can be, and indeed may be, providing the same services. The deficiencies and shortcomings of allied health manpower information have discouraged any attempt to treat health care delivery as a "system," and seem to have encouraged the tendency to focus exclusively on patient care or sick care, and on the role of physician and nurse to the exclusion of other modes of health services (such as health maintenance and promotion) and other health providers (such as allied health personnel). If health care delivery is to become an efficient and productive system, then all components and their interrelationships must be explored and utilized. The allied health professions comprise a vital segment of the total health care "system," and must achieve integration within all aspects of the health "system"--including research and knowledge production--to realize their potential.

The 1980s will place increasing pressures on policymakers to meet national priorities under the limitations of dwindling resources and public demand for cost-accountability. Effective decisions will be next to impossible unless the contributions of allied health manpower are clearly recognized and taken into account. Many of the nation's health priorities--such as bringing services to the medically underserved areas, meeting the health needs of the dis-

abled and the elderly, and controlling the rising cost of health care--cannot be met without increased participation of allied health personnel. Yet the Administration has asked for zero funding for allied health education during the last three years. The case for allied health is yet to be made.

RESEARCH AGENDA FOR HEALTH MANPOWER

Evaluating different methodologies of manpower supply and requirements projections, Kriesberg and others concluded that "Unplanned and unfocused studies of health manpower requirements and supply yield a meaningless collection of statistics."[34] Coordination of health services as well as health research are essential to effective planning and policymaking. Congress gave specific legislative authority under the Health Services Research, Health Statistics, and Medical Libraries Act of 1974 (Public Law 93-353) to establish a Cooperative Health Statistics System. Further, in 1974, the National Health Planning and Resources Development Act authorized the establishment and operation of health planning agencies at the local level (health systems agencies) and at the state level (state health planning and development agencies) in order to plan and administer health services more effectively.

The Cooperative Health Statistics System is supposed to provide current national, state, and local data that have uniform definitions in the areas of health status; resources of health manpower, facilities, and services; utilization of health services and facilities; expenditures and sources of funds for health services and for the development of health resources, and environ-

mental, social, and other health hazards.[35] Although the emphasis was initially on physician and nursing manpower and services, the system had the potential for initiating and standardizing the collection of information pertinent to allied health. With most of the federal support now removed, the prospects are once again dim for the establishment of a fully integrated and cooperative system of health statistics.

With increasingly limited resources, it becomes essential to have guidelines for research and data collection, and to have such activities well coordinated. It is important to know the cost-effectiveness of the information requested for policy purposes. For too long, funding agencies have supported development and improvement of forecasting methodologies for single occupations without examining how useful such information is for overall policy purposes.

The narrow research perspective used in the past is not going to serve the needs of the nation in the 1980s when pressure for coordination, better utilization of resources, and cost-effectiveness of services will continue to grow. Choices will need to be made regarding which types of information can best answer which types of questions. Funding for research and data collection will have to reflect not the political strength and visibility of one group or another, but the overall utility of the information for making decisions for the total health care delivery system.

A health manpower research matrix is offered in Table 2 as a guideline for health planners, researchers, and funding agencies. The matrix approaches health manpower information needs in a systemic way. It presents the various types of information that can be made available, ranging from simple census-type (enumerative) data to more complex information.

Column headings in Table 2 refer to areas of information needed for health planning and policymaking, while row headings refer to levels of information. Both areas of information and levels of information increase in complexity as one reads from left to right and top to bottom. The cells present examples of research questions; the outcomes (column and row marginals) show types of questions that would be answered if information in each cell were available.

Four areas of information needs are specified in the column headings: (1) supply and requirements, (2) distribution, (3) utilization, and (4) productivity.[36] Supply and requirements have generally dealt with two simple questions: Is there currently enough manpower overall? Will there be enough manpower in the future? National interest has only recently shifted to the question of distribution: Is the manpower in the right place? Related to the problem of supply and requirements are also questions of utilization (Are providers making the best use of available manpower?) and productivity (Are there ways in which existing manpower can provide more or better services?). Both productivity and utilization, but also the issue of distribution, hinge to a large degree on the proper "mix" of appropriate personnel and the optimal coordination of efforts. The supply and requirements question cannot be settled without examining the contributions, overlaps, and interdependency of health manpower roles and functions.

The row headings in Table 2 refer to levels of information.[37] The most readily available and widely used is enumerative information, that provides simple head counts of personnel, programs, employment settings, etc.

--For instance, enumerative information needs under supply and requirements would include: How many educational programs? How many graduates?

TABLE 2. HEALTH MANPOWER RESEARCH MATRIX

Information Levels	Information Needs: Supply and Requirements	Information Needs: Distribution	Information Needs: Utilization	Information Needs: Productivity	Outcomes (Policy Questions)
Enumerative	How many in the education pipeline? How many employed? Number of salaries positions open? How many will be required?	Geographic distribution of educational programs? of manpower? of demand?	Numbers and types of personnel employed in different settings? Practitioner distribution by work settings? Staffing patterns?	Manpower ratios in different regions, states, work settings? productivity hours? services rendered?	How many? what type? work where? Boundaries of the health system? its components?
Descriptive	Characteristics of students? graduates? active and inactive workers? Entry rates? Separation rates? Characteristics of work settings and requirements?	Relationships between programs and work settings? Which graduates from which programs work where? Characteristics of those working in medically underserved areas?	Characteristics of manpower in different settings? salaries? What mix of health manpower utilized in each setting?	What output is related to which mix of manpower in what setting? Which is more cost-effective? What factors affect productivity?	Characteristics of components of the health manpower? Major factors correlating with supply, distribution, utilization, and productivity?
Analytic	How are career choices made? How can supply pool be controlled? What incentives would produce increases in supply most cost-effectively?	Relationship between licensure and distribution? How can manpower be distributed more evenly? What incentives are most cost-effective? retraining? recruiting from other occupations?	Effects of credentialing? overlap in roles and functions? Which manpower can be used more effectively and at less cost to give the same service? How to relate employer need to education?	What incentives or changes required in the present system to increase productivity? How to integrate and coordinate health services and manpower?	How to change the health manpower? How changes in one variable or component affect another?
Outcomes (Policy Questions)	Is there enough manpower overall? How to increase or decrease supply? How to determine and meet need?	Is the manpower in the right places? How to redistribute? What incentives to use to meet critical shortages in the short run? in the long run?	Are providers making the best use of skills and numbers of available manpower? Is education responsive to types of competencies required?	Are there ways in which existing manpower can provide better or more services to wider groups of population most cost-effectively?	

How many workers are currently employed? Unemployed? How many will be required?

--Under distribution: How many work where? How are educational programs distributed geographically?

--Under utilization: How many and what types are employed in what settings?

--Under productivity: How many work hours? Volume of services provided per setting? Per practitioner?

Enumerative information basically involves head counts and can best be obtained through nationwide studies, such as employer surveys, practitioner surveys, professional association membership surveys, inventories of educational programs, etc. Enumerative information, if complete, is essential in determining the boundaries of the health care delivery system and identifying its components: that is, how many of what type where.

The second level can be referred to as descriptive information which is more detailed than enumerative information and adds to our understanding of the characteristics and components of the health care delivery system and health manpower. Descriptive information does not explain how and why the system works, but presents some zero-order correlations between factors that could give planners and policymakers more confidence in projecting the outcomes of their programs.

--For instance, under supply and requirements, descriptive information would provide answers to such questions as: How do labor force entry or separation rates differ by sex and age for each group? What demographic factors correlate with career choice?

--Under distribution: Which graduates from which programs work where?

What program or student characteristics are related to working in medically underserved areas?

--Under utilization: What are the demographic characteristics of personnel employed in different settings? Which mix of health manpower is utilized in what settings?

--Under productivity: What output is related to which mix of manpower? Are there differences in service outcomes? In cost-effectiveness? What factors are related to increased or decreased productivity?

Descriptive information requires more complex study design than does enumerative information. It involves follow-up surveys of graduates, special in-depth studies of practitioners, employment settings, programs, etc. Such studies are costly and require careful sampling techniques to ensure representativeness. Descriptive studies need not be national in scope; such studies undertaken at the state or regional levels can produce nationally useful results if they utilize standard definitions, classifications, and nomenclature, and carefully report their methodological procedures.

Finally, the most complex level is analytic information which ideally leads to the examination and definition of the functional relationships among attributes of the system. Areas that can be addressed with analytic information include the following:

--Under supply and requirements: How are career choices made? How can supply be controlled? What incentives would produce increases, or decreases, in supply most cost-effectively?

--Under distribution: What incentives would improve distribution of manpower? Is it better to retrain? Attract transfers from other occupa-

tions? Establish new programs?

--Under utilization: What are the effects of credentialing in utilization of manpower? What are the overlaps in roles and functions? How can best mix of health manpower be obtained?

--Under productivity: What incentives or changes are required in the present system to increase productivity?

Analytic information provides planners and policymakers with information essential to evaluate program alternatives and assess consequences of actions. It allows planners and policymakers to take "manipulative" rather than simply to take "adaptive" responses.[38] Adaptive responses are generally based on simple enumerative information and tend to be shortsighted. For example, establishing a new educational program in a shortage area without paying any attention to surpluses in other areas or to changing conditions in health care delivery which may soon make the educational program obsolete. Manipulative responses require a better understanding of the system and how a change in one component may affect another. For example, studies of the relationship between increased responsibility and productivity may lead planners and policymakers to redefine job specifications and to help enact legislation concerning credentialing. Such action would lead to better use of existing health manpower rather than introducing new or more manpower. However, analytic level studies rarely exist and policymakers usually make do with enumerative information and, sometimes, with limited amounts of descriptive information. Sophisticated research methodologies (such as experimental design, multivariate analysis) are often required to obtain analytic information. Further, analytic studies cannot be designed without adequate enumerative and descriptive data. Thus, each

information level helps accumulate knowledge essential for the next level depicted in the health manpower research matrix.

A few observations might be made here concerning this matrix. First, in the best of all possible worlds, all information would be available for all health manpower. Since this prospect is not even on the horizon, some division of labor and resources might be suggested.

The usefulness of enumerative information lies precisely in its scope and comprehensiveness. The federal government is the most appropriate agency for sponsoring or undertaking such national survey studies. Although a full and total head count of allied health manpower probably defies even simple enumeration, what can be suggested is that the federal government assist those occupations that do not have national professional associations in developing and strengthening their research and informational capabilities. Second, the federal government should lead the way to establishing a minimum data set for allied health manpower. This would involve coordination of activities in order to identify a central core of data elements useful to most agencies and groups working with and collecting allied health information, and to establish standard definitions, classifications, and measurements.

Toward the latter goal, the Bureau of Health Professions supported a workshop in September 1979. Representatives from federal agencies and professional associations came together to exchange information, discuss problems, and to develop strategies for cooperation. The participants of the first workshop formed an alliance, called the Allied Health Manpower Forum. The Forum has met twice since then and has moved swiftly but deliberately toward the development of a cooperative, systematic, and inclusive way to collect and analyze

allied health manpower data.[39] A task force is already at work developing minimum data sets for allied health manpower.

One of the most beneficial aspects of the Forum has been the establishment of a network of resource people and organizations. The Forum provides an opportunity for agencies and organizations to compare their data needs and collection activities for the first time. Currently, the Forum is comprised of professional associations representing 11 allied health areas--audiology and speech therapy, dental assisting, dental hygiene, dietetics, medical laboratory technology, medical records, occupational therapy, physical therapy, radiologic technology, respiratory therapy, and microbiology. Represented in the Forum are the Bureau of Health Professions, Bureau of Labor Statistics, National Center for Health Statistics, and the Veterans Administration. Also represented are the American Hospital Association, American Medical Association, and the American Society for Allied Health Professions. There is currently no organization representing data needs of state planners. Regional organizations, such as the Southern Regional Education Board, can play a vital role in participating in the Forum in order to reflect state data needs, and at the same time, improve the usefulness of state-level information by implementing standard procedures.

Unlike the enumerative data case where standardized national studies seem essential, useful studies at the descriptive and analytic levels can be carried out at state or local levels. A good example of such a descriptive study is that undertaken by the Texas Coordinating Board of Higher Education in 1978.[40] The Board was asked to approve a baccalaureate program in nuclear medicine technology. A straightforward survey of employed technologists showed clearly that respondents considered a baccalaureate-level training unnecessary and

superfluous. On the basis of this survey, the Board rejected the proposed program. Proper dissemination of state studies such as this can lead to the gradual accumulation of much-needed descriptive information.

The picture is more difficult at the analytic level. Such studies should have an adequate base of information at the enumerative and descriptive levels and a strong research orientation and capability among allied health professionals and educators. Until more efforts are made toward reaching these two goals, expert opinion and best "guesstimates" will have to provide the necessary policy guidance. Again, the federal role will probably be a vital one in the development of essential resources for allied health research. The National Commission on Allied Health Education recommended increasing federal support and establishment of a coordinated system of regional centers for research and development in allied health.[41] Such centers could play a vital role in building up research and informational capabilities of allied health educators and lead to accumulation of much needed information at descriptive and analytic levels.

In summary, close monitoring of the vital allied health segment of the nation's health work force is essential in order to plan and ensure optimal utilization of resources.[1/] Effective planning requires adequate information. Without adequate funding and support for research and data collection, allied health cannot meet its information needs. Without adequate data, the proponents of allied health cannot make their case and bring about effective and just legislation. This is the vicious circle that has ensnarled allied health during the last two decades; the problem must be addressed and resolved in the coming years.

POSTSCRIPT: MAKING DECISIONS WITHOUT IDEAL DATA

The deficit of data about the allied health professions, as described by Dr. Holmstrom in the preceding sections, is a reality especially at the broad national level. If measures were instituted immediately to establish a reliable data base for all the many aspects of allied health manpower, several years would be required to accumulate and analyze such an information base. It probably will never be cost-effective to gather and analyze sufficient data about some aspects of allied health practice. Meanwhile, however, decisions must be made about educational programs for the allied health professions/occupations.

For the past several decades, the major decisions about allied health education programs have been concerned with whether to begin them or expand them. The growth in all areas of higher education, together with the well-documented shortages of virtually all kinds of health manpower, were almost always sufficient justification for new or expanded allied health education programs. Little attention was given to matters of distribution, utilization, or productivity and how these should be considered in planning allied health education programs.

However, with the 1980s new issues are emerging. During the last two decades, the federal and state efforts to increase the numbers of health practitioners have been so successful that oversupplies in manpower are predicted for 1990, and later in physicians and in several other health professions. At

this point, no one knows whether increasing the number of physicians and dentists increases or decreases the demand for allied health practitioners. The report of the Graduate Medical Education National Advisory Committee recommends that there be a moratorium on the growth of training programs for physician extenders (nurse practitioners and physician assistants) and other non-physician health care providers until this matter can be evaluated.

In addition, federal support for health professions education is dwindling and state budgets for higher education are faced with double-digit inflation that makes it highly unlikely that educational planners and policymakers can look forward to unquestioned expansion, as was often the case in the past. Indeed, the pool of high school graduates which traditionally has been the source for recruitment of allied health students is shrinking, and many of the existing training programs find that they are faced with declining enrollments. It will be difficult for legislators and others who provide funds for training programs to expand or even to continue support for training programs in the face of inflation, declining enrollments, and possible surpluses of manpower.

Allied health education planners will need much better data for restructuring and justifying training programs in the future. A reliable and comprehensive, national data base would be a tremendous asset. However, even without such a national data base, there are several sources of data available to state and local planners to use in making policy decisions about the needs for various kinds of allied health education programs, the appropriate numbers of students, and the kinds of students and competencies they should develop.

The state and local health planning agencies are responsible for assembling and analyzing data about health manpower. They are not supposed to de-

velop new sources of such data, but they are expected to know about data already available, such as surveys conducted by local hospital associations or local associations of nursing home operators or local professional societies. These data have some of the same limitations listed by Dr. Holmstrom in the national data, but nevertheless, they do provide information about many aspects of the local needs, demands, and job markets. The local Health Systems Agencies and the State Health Planning and Development Agencies should also know about any plans for expansions or changes in local health facilities that will influence the amount or nature of the demand for allied health manpower. The data from the plans for those facilities are available to allied health educational planners.

Persons responsible for planning and policy development for allied health education programs should insist that there be some kind of systematic assessment of the need for any allied health education program both before such a program is undertaken and periodically along the way to assure that the program is being designed to meet the needs of the current and changing job markets. This is particularly desirable in the case of the allied health specialties that are based on a rather narrow technology. New technologies or new patterns of manpower utilization can make workers obsolete in a short time. The training program must be alert to such changes in order to redesign the programs to meet the changing need.

Assessments of need can be carried out in several ways. One method is to survey the area's larger employers, such as hospitals, clinics, clinical laboratories, health departments, and rehabilitation facilities, to learn firsthand about their perceptions of the need for both numbers and specific compe-

tencies of workers. Another approach to needs assessment is to convene a community forum of persons from some of these same agencies and representatives of the relevant professional groups, licensure boards, etc., to obtain some of this same information and to explore some of the more subtle aspects of the job market--turnover, patterns of utilization, special needs for personnel, for example, in rural areas or for odd shift hours. Such a forum may lead to special studies of some of these issues. These local studies are especially desirable because there are wide variations in the patterns of utilization of various kinds of allied health workers within different localities and regions. For example, rural areas are much more likely to need workers with many competencies compared to urban areas that generally use more highly specialized technologists, although there are variations on this pattern in some regions of the nation.

There are special problems in assessing the need for those allied health specialists who have private or independent practices or who are frequently employed in private physicians' or dentists' offices or those who work in small community agencies, such as sheltered workshops or senior citizen centers. To some extent, this need can be assessed by examining the want ads in the area's major newspapers or by talking to the persons who manage local proprietary or college placement services. It is also well to inquire of some sampling of these independent practitioners and agencies about their perceptions of the need. Frequently, these individuals and agencies have networks or contacts which enable them to give some descriptive data about the ways in which allied health practitioners are used in independent practices and agencies and something of the likely demand for allied health workers by this sector.

Another source of data for existing training programs is the graduates of the programs. Programs should systematically follow up their graduates to assure that they are obtaining employment and that the training they have received is appropriate for the work they are actually expected to carry out. However, the same survey that is used to follow up graduates to obtain these kinds of data can also be used to get some assessment of the job market for graduates and a reporting of some of the obstacles and questions which graduates have encountered in seeking and holding employment.

Another mechanism used by some allied health education programs is a Community Advisory Committee of professionals and officials from local health agencies who meet periodically. One of the major functions of a Community Advisory Committee is to give the educational program information about the needs for the program--especially changing needs that may not yet be reflected in formal surveys. An Advisory Committee is also helpful in program operations to review program activities, to assist in developing field training opportunities, and to help the program locate jobs for its graduates.

Allied health education planning in the 1980s will be more complex than in the past. These fields are unlikely to have the comprehensive, national data about supply, demand, and utilization that would be desirable to make precise decisions, but there are still many state and local resources for obtaining data for policy planning and decision making. Educational planners will need to be sensitive to local resources for data. It will require creativity and expertise to locate and develop these resources, but such qualities will be essential to properly plan and justify allied health education training in the future.

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